

Colloid Thruster for Attitude Control Systems (ACS) and Tip-off Control Applications, Phase II

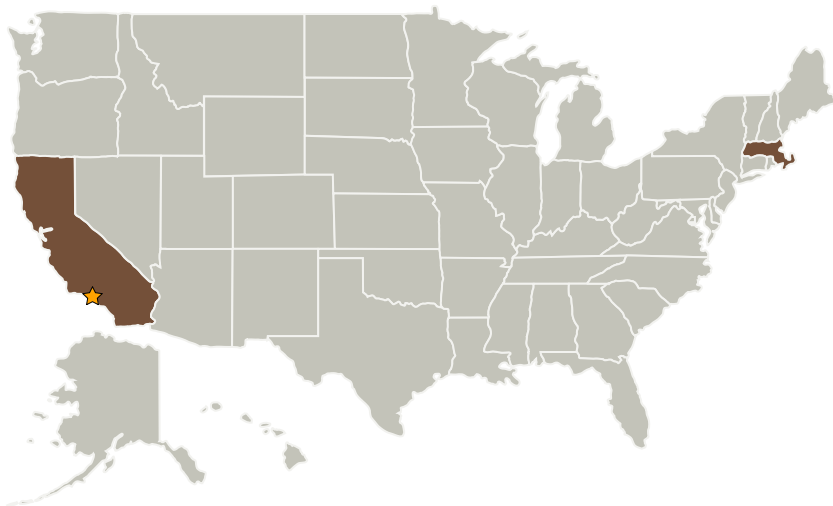
Completed Technology Project (2009 - 2011)



Project Introduction

Busek proposes to develop and deliver a complete engineering model colloid thruster system, capable of thrust levels and lifetimes required for spacecraft operational tasks such as tip-off de-tumbling and attitude control. The self contained thruster system shall be capable of delivering $\sim 75\mu\text{N}$ with sufficient total impulse to de-tumble spacecraft such as LISA. The proposed Phase 2 work builds upon a highly successful Phase 1 effort where the key principals of the innovation, a propellant isolation membrane and a passive capillary feed system, were unequivocally demonstrated. The proposed system is completely passive with no moving parts and requires no valves to ensure its high reliability. In order to inhibit propellant contamination prior to operation in space, a unique isolation membrane will separate propellant from the emitter. Upon heating the isolation membrane dissolves, allowing propellant from a collocated reservoir to flow forward to the electrospray thruster without contamination. The thruster consists of an array of self adjusting emission sites that are activated by application of an electric field that initiates emission. The delivered thrust is modulated by varying the applied electric field. The significant innovations of the proposed colloid thruster include: a compact, low power, modular thruster system containing no moving parts, which is capable of delivering sufficient thrust for spacecraft tip-off control and ACS applications.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory (JPL)	Lead Organization	NASA Center	Pasadena, California
Busek Company, Inc.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Natick, Massachusetts

Primary U.S. Work Locations

California	Massachusetts
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Project Transitions

**January 2009:** Project Start**January 2011:** Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.1 Chemical Space Propulsion
 - └ TX01.1.1 Integrated Systems and Ancillary Technologies